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FACULTY OF LIFE SCIENCES
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Expression of class I and II *Knotted* genes in *Kalanchoë blossfeldiana* cv. 'Molly' results in novel compact plant phenotypes.

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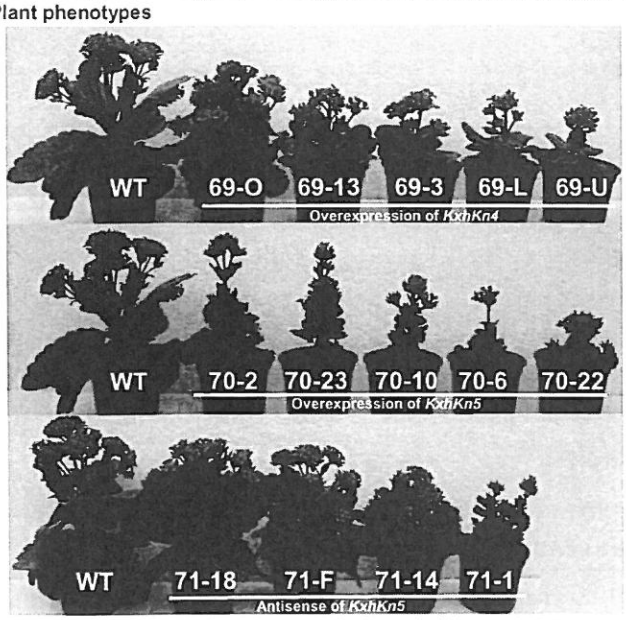
Introduction

Vivipary is the ability to asexually form new complete plantlets on mature plant organs, like leaves and inflorescences. It is found in several plant families and serves as an effective adaptive mechanism for spreading a specific genotype in a favourable environment. Vivipary is common in the genus *Kalanchoë* either as induced plantlet formation, triggered by stress, or as constitutive plantlet formation. *K. blossfeldiana* and derived interspecific hybrids are very important for the horticultural plant industry and *Kalanchoë* rank as top one in Denmark with over 42 million plants produced in 2007. *K. daigremontiana*, *K. delagoensis* and their hybrid *K. x houghtonii* have plantlets formed along the leaf edges and these plants are known as "Mothers of Thousands". We have cloned several *Knotted (Kn)* genes putatively involved in vivipary. Two constructs, called 69 and 70 carrying a full coding sequence of a class II and class I *Kn* homeotic gene, *KxhKn4* and *KxhKn5*, respectively, were overexpressed in *Kalanchoë blossfeldiana* cv. 'Molly', a species that do not form plantlets. Furthermore, an antisense construct was made of a partial sequence of gene *KxhKn5*, called construct 71, and this construct was also transformed into 'Molly'.

Molecular characterization of transgenic *Kn* lines

PCR primers	Molly	69 line					70 line					71 line			
		3	13	L	O	U	2	6	10	22	23	1	14	18	F
69															
70															
71															
nptII															
KdActin															

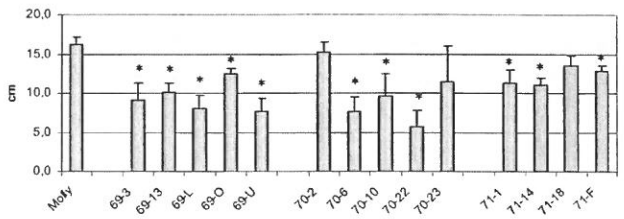
Plant phenotypes



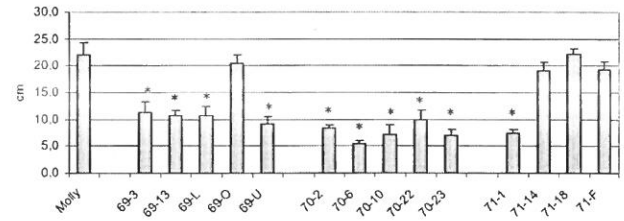
Overexpression (top, middle) and downregulation (bottom) of *Kn* genes in *Kalanchoë blossfeldiana* cv. 'Molly' result in compact plants with novel leaf shapes

Plant quality analysis

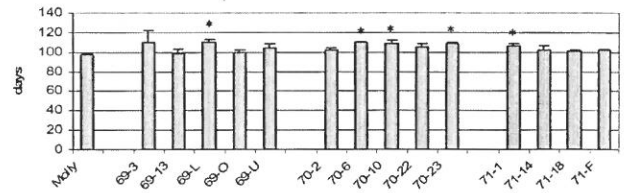
Plant height



Plant diameter



First open flower



Number of inflorescence branches

line	'Molly' Wt	69-O	71-18
Number of branches	12.4±1.9	13.6±1.1	12.2±0.9
Number of branches per cm	0.77	1.08	0.90

* Indicate significant differences

Conclusion

- Endogenous *Kalanchoë Kn* genes can be used as a cisgenesis approach to improve the ornamental quality in *Kalanchoë*
- Transgenic *Kn* lines were dwarf and compact
- Some lines had a relative higher number of inflorescences
- The transgenic lines were not or only slightly delayed in flowering compared to control plants
- Novel leaf shapes were developed by overexpression and downregulation of gene 70
- The transgenic *Kn* lines did not develop plantlets